A Lofty Mountain, Putrefying Flesh, Styptic Water, and Germinating Seeds: Methodological Reflections on Experimental Procedures from Pascal and Perier to Redi and Beyond

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This paper examines the rise of the "parallel trial" as an experimental procedure in the second half of the 17th century. By "parallel trial" I mean the notion of performing two parallel experimental trials with minimal variations in order to weed out those events and phenomena naturally occurring in nature as opposed to those generated by the experimental setup. Clearly the notion of "parallel trial" is related to the modern notion of control experiment, but whereas this notion has been codified in a standardized set of procedures, the 17th-century practices I investigate were considerably looser: for example, mathematical/statistical methods for handling the results were lacking, the number of cases in the two parallel trials was not the same, or the conditions in which the trials were carried out were not spelt out. Therefore those experiments are best captured and described by a different term.

I examine the Puy-de-Dome experiment by Blaise Pascal and his brother in law Florin Perier, whereby a "continuous experiment" was carried out at the foot of the mountain whilst Perier ascended it, in order to prove that the descent of the column of mercury carried to the top of the mountain was unequivocally due to the higher altitude; Francesco Redi's experiemnts on spontaneous generation, in which he placed pieces of flesh in two containers, one covered and protected by flies and the other open, proving that putrefying flesh does not generate insects by itself; Redi's experiments to test the properties of a styptic water coming from France that was advertized as a cure for dangerous arterial wounds, in which he compared its powers to the properties of standard water from a well; and Marcello Malpighi's experiments to establish the role of cotyledons in the germination of seeds, whereby he argued against Giovanni Battista Trionfetti that growth is hindered or delayed by the removal of cotyledons compared to the case when the cotyledons are retained.

These cases range from the physico-mathematical disciplines to natural history and medicine, pointing to a growing methodological awareness about experimental procedures and to a concern about the natural variability of experimental results: the height of mercury in the barometers is not always constant, some arterial wounds heal without any intervention, etc. Together, they highlight a new awareness of the need to rule out competing explanations for experimental results. Thus the cases I examine represent an important chapter in the history and philosophy of experimentation, one that has surprisingly been left at the margins of current accounts of experimentation in the seventeenth century.